REMARKS/ARGUMENTS

Favorable consideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-22 and 24 are presently pending in this application, Claims 23 and 25-29 having been canceled, and Claims 1 and 3-22 having been amended by the present amendment.

In the outstanding Office Action, Claims 1-4, 7-11, 14-16, 19-21, 24, 25 and 27-29 were rejected under 35 U.S.C. §102(e) as being anticipated by Kano et al. (U.S. Patent 6,242,719); and Claims 1-29 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ito et al. (U.S. Patent 6,072,162) in view of Nobori et al. (U.S. Patent 5,616,024) or Kano et al. and Allen (U.S. Patent 4,057,707) or Mio et al. (U.S. Patent 4,536,645).

Claims 1 and 3-22 have been amended herein. These claim amendments find clear support in the specification, claims and drawings. For example, Claims 1 and 3-6 are believed to be supported by the original claims, Claims 7 and 11 by page 11, lines 16-17, of the specification, Claims 8 and 12 by page 11, lines 16-19, of the specification, Claims 9, 10, 13-17 and 19-22 by the original claims, and Claim 18 by page 18, lines 4-7, of the specification. Hence, no new matter is believed to be added thereby. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work in a joint effort to derive mutually satisfactory claim language.

Briefly recapitulating, Claim 1 as currently amended is directed to a ceramic heater to be used in semiconductor industry, and the ceramic heater includes a disc-form ceramic substrate having a heating surface and comprising a nitride ceramic or a carbide ceramic, a resistance heating element comprising at least one circuit, the resistance heating element being arranged on a surface of the ceramic substrate, and an insulating covering deposited on the resistance heating element, wherein the resistance heating element is positioned on an

opposite side of the heating surface. By providing such an insulating covering, the resistance of the resistance heating element is prevented from changing since the resistance heating element is insulated from atmospheric gas. Further, heat is prevented from radiating from the resistance heating element formed face, thereby preventing the temperature of the heating surface from lowering. Moreover, the distance between the ceramic substrate and a wafer is kept even since the heating surface is provided on the opposite side of the resistance heating element formed face, thereby heating a wafer uniformly.

These effects are apparent from comparison of Examples and Comparative Examples described in the specification. In Examples 1 to 6, the change in the resistance of the resistance heating element is as small as 0.1 to 0.3% and the temperature change is as small as 0.1°C to 0.2°C. On the other hand, in Comparative Example 2 where no insulating covering is formed, the change in the resistance of the resistance heating element is 20% and the temperature change is 0.5°C. Thus, it is shown that the insulating covering suppresses the change in both resistance and temperature. By depositing an insulating covering on the resistance heating element, change in the resistance value, which is a factor of temperature change in the heating surface, and heat radiation from the back surface are significantly reduced. Therefore, the ceramic heater recited in Claim 1 has excellent properties for application in the semiconductor industry.

<u>Kano et al.</u> disclose a ceramic heater having the support substrate 2, heat generating layer 3, and protective layer 4. Nevertheless, <u>Kano et al.</u> are not believed to teach "a resistance heating element comprising at least one circuit, said resistance heating element being arranged on a surface of said ceramic substrate ..., wherein said resistance heating element is positioned on an opposite side of said heating surface" as recited in amended Claim 1. As illustrated in Fig. 3, the heat generating layer 3 is formed on the heating surface. On the other hand, as mentioned above, the ceramic heater recited in Claim 1 according to the

present invention has the resistance heating element formed on the opposite side of the heating surface, and heats a wafer more uniformly. Therefore, the structure recited in amended Claim 1 is believed to be quite distinguishable from Kano et al., and thus is not anticipated nor rendered obvious thereby.

Ito et al. disclose a heating device having the heater 14 and the heat diffusion plate 11. There is no insulating covering deposited on the heater 14. Ito et al., however, do not teach "a resistance heating element comprising at least one circuit, said resistance heating element being arranged on a surface of said ceramic substrate ..., wherein said resistance heating element is positioned on an opposite side of said heating surface" as recited in amended Claim 1. Furthermore, the Ito et al. heating device corresponds to Comparative Example 2 described in Applicant's specification, and it cannot suppress change in the resistance value and heat radiation. Moreover, the heater 14 is arranged in axial symmetry with respect to the gas stream 12 flowing through the center of the heat diffusion plate 11, which is made of AlN (col.6, lines 20-23). This structure is designed to control the gas stream for attaining the temperature evenness of a wafer, not to control the temperature evenness of a ceramic substrate. This is apparent from Fig. 13B showing that the surface temperature of the heat diffusion plate 11 is higher in upstream side. Therefore, the mechanism of uniform heating disclosed in Ito et al. is completely different from that of what is recited in Claim 1. Even if an insulating covering is formed on the heater 14 of the Ito et al. heating device, it gives a different effect on the wafer temperature. Accordingly, the structure recited in Claim 1 is distinguishable from Ito et al. and is not believed to be rendered obvious from Ito et al.

Nobori et al. disclose a ceramic heater having a ceramic substrate and a resistant heating element embedded within the ceramic substrate, and fail to teach "a resistance heating element comprising at least one circuit, said resistance heating element being arranged on a surface of said ceramic substrate ..., wherein said resistance heating element is positioned on

an opposite side of said heating surface" as recited in amended Claim 1. With the Nobori et al. device, it takes longer to cool the resistant heating element. Moreover, the change in the resistance value and heat radiation, are irrelevant in this heater. On the other hand, the ceramic heater recited in Claim 1 has a resistance heating element on a surface, and thus the resistance heating element cools down quickly. Also, the heater recited in Claim 1 faces the above-mentioned problems, and the insulating covering is therefore required. As such, the Nobori et al. ceramic heater does not provide the effects described in Applicant's specification, and the structure recited in Claim 1 is believed to be clearly distinguishable from Nobori et al. Thus, the structure recited in Claim 1 is neither anticipated by nor obvious over Nobori et al.

Allen discloses *a cooking unit* having a plate of a glassy material, an electrical heating element and a glaze covering the heating element. Also, the plate is not a nitride ceramic or a carbide ceramic. A nitride ceramic and a carbide ceramic are reactive to water. For example, AlN reacts with water to form ammonia. A nitride ceramic and a carbide ceramic are not suitable for a cooking unit which is often subjected to water. Therefore, the structure recited in Claim 1 is clearly distinguishable from Allen.

Mio et al. disclose a heating unit having the solid body 1, refractory layer 2, electroconductive layer 3, and electrically insulative protective layer 6. Nonetheless, Mio et al. do not teach "a resistance heating element comprising at least one circuit, said resistance heating element being arranged on a surface of said ceramic substrate ..., wherein said resistance heating element is positioned on an opposite side of said heating surface" as recited in amended Claim 1. According to Mio et al., the surface where the electroconductive layer is formed is the heating surface, and if the heating surface is opposite to the surface where the electroconductive layer is formed, the object must be heated directly on the surfaces of the solid body 1. In such a case, the heating cannot be conducted properly since the solid body 1

is wood or plastic (col.1, line 55) which has low thermal conductivity. Accordingly, the structure recited in Claim 1 is also distinguishable from Mio et al.

Applicant also wishes to point out that the Ito et al. heating device has a completely different mechanism of heating as discussed above, and requires no insulating covering. Thus, Ito et al. cannot be combined with the Allen or Mio et al. device. Further, the Allen and Mio et al. heating units are different in material from the heater recited in Claim 1. None of these references is believed to provide the motivation to attain the structure recited in Claim 1. Nor do Nobori et al. and Kano et al. provide such a motivation.

Because none of Ito et al., Nobori et al., Kano et al., Allen and Mio et al. discloses the resistance heat element as recited in Claim 1, even the combined teachings of these cited references are not believed to render the structure recited in Claim 1 obvious.

For the foregoing reasons, Claim 1 is believed to be allowable. Furthermore, since Claims 2-22 and 24 ultimately depend from Claim 1, substantially the same arguments set forth above also apply to these dependent claims. Hence, Claims 2-22 and 24 are believed to be allowable as well.

In view of the amendments and discussions presented above, Applicant respectfully submits that the present application is in condition for allowance, and an early action favorable to that effect is earnestly solicited.

Respectfully submitted,

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